

**Remarks**

This Amendment is being filed concurrently with a Request for Continued Examination ("RCE"). Reconsideration and allowance of this application, as amended, are respectfully requested.

New claims 18-20 have been added to further define the scope of protection sought for Applicants' invention. Claims 1-20 are now pending in the application. Claims 1, 16, and 18 are independent. The rejections are respectfully submitted to be obviated in view of the amendments and remarks presented herein. No new matter has been introduced through the foregoing amendments.

35 U.S.C. § 103(a) - Tetsuo, Hirota '965, and Ueda

Claims 1-4 and 6-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 57054832 to Tetsuo et al. (hereinafter "Tetsuo") in view of U.S. Patent No. 3,664,965 to Hirota et al. ("Hirota '965") and U.S. Patent Application Pub. No. 2002/0012767 of Ueda et al. ("Ueda").

The examiner acknowledges that Tetsuo "does not explicitly disclose the testing liquid being foam-forming" (Office Action page 2, numbered paragraph 2). The examiner also acknowledges that "[m]odified Tetsuo" (i.e., the combined disclosures of Tetsuo and Hirota '965) "fails to disclose that the test piece is made of a composite material consisting of at least

one cover layer and a construction core having a plurality of cavities" (Office Action page 3).

The rejection of claims 1-4 and 6-10 under § 103(a) based on Tetsuo, Hirota '965, and Ueda is respectfully traversed. For at least the following reasons, the combined disclosures of Tetsuo, Hirota '965, and Ueda would not have rendered obvious Applicants' claimed invention.

The combined disclosures of Tetsuo, Hirota '965, and Ueda do not teach all of Applicants' claim features. By way of review, claim 1 defines a method of leak-testing a component made of a composite material consisting of at least one cover layer and a construction core having a plurality of cavities. For example, two cover layers 5, 6 made of an impregnated carbon fiber fabric are arranged on either side of a lightweight core 4 having a number of hollow chambers 7.

As explained in Applicants' Amendment filed May 4, 2009, claim 1 defines a method in which the component to be leak tested is "made of a composite material consisting of at least one cover layer and a construction core having a plurality of cavities" and that a test area is wetted "with a *film* of a foam-forming testing liquid." Claim 1 thus defines a method in which the component to be tested is made of a composite material consisting of at least one cover layer and a construction core having a plurality of cavities (see disclosure in connection with Figures 3a and 3b at specification page 12).

Furthermore, the step of wetting the component test area has been defined in claim 1 to include applying a *film* of a foam-forming testing liquid (see specification page 13, last line). As urged previously, the phrase "wetting" defines the method step of applying a *film* of liquid, as distinguished from prior art methods in which the test component is fully submerged or immersed in a water basin or the like.

Applicants' method, therefore, is particularly well suited for delicate composite materials, as only a thin film of foam forming liquid is applied to the test component. This is entirely different from the immersion techniques known in the prior art. The immersion techniques are not only restricted by regulations, but also require cumbersome and time consuming drying of the component after the leakage test.

On the other hand, the present invention simply relies on *wetting the test area with a film of testing liquid*, thereby causing little strain on the component and preventing or at least largely reducing moisture from being soaked into the cavities.

The disclosures of Tetsuo and Hirota '965 remain deficient for all of the reasons presented in the Amendment of May 4, 2009. As explained previously, conventional leak tests not only suffer from a number of drawbacks, but could not even be applied to the class of materials associated with the instant invention. In particular, prior art methods, in which the test component is *immersed* in a liquid-filled basin, usually require the component to

be *submerged* for a sufficiently long period in order to allow for a reliable detection of flaws. However, certain regulations limit the immersion time period for composite materials to a mere 30 seconds, so that immersion methods cannot be successfully applied to the class of materials targeted by the present invention.

Tetsuo merely discloses an immersion method. A liquid contained in a liquid basin is heated in order to increase the temperature of a test piece. Gas sealed in the test piece expands, whereupon the gas leaks through defective points of the test piece. Besides not being feasible for composite materials, as has been outlined above, such prior art immersion methods suffer from various drawbacks. In particular, methods involving the immersion of the test component in a liquid-filled basin require a complex handling with large components. Furthermore, providing for a water basin, and especially heating the water bath, is energy consuming and thus costly.

Tetsuo, therefore, is directed to a fundamentally different technique, namely *immersing* a test component in a liquid-filled basin, as opposed to Applicants' claimed *wetting* of a composite material with a *film* of testing liquid and checking for the formation of bubbles. Applicants' claimed method is tailor made for use with composite materials, because only a thin *film* of foam-forming liquid must be applied to the test component.

Hirota '965's leakage test is also different from Applicants' claimed method. Hirota '965 relies on subjecting a cavity to a change in pressure, whereupon leaks can be detected from bubbles emerging from a film that has been applied to the surface of the test component. Therefore, since Hirota '965 relies upon a change in pressure, Hirota '965 of course fails to disclose heating the test area in order to cause bubble formation, as is a claim requirement of the present invention.

Accordingly, the combined disclosures of Tetsuo and Hirota '965 would not have rendered obvious the embodiment of the invention defined by claim 1.

And now, the examiner relies upon Ueda's teaching of a "honeycomb sandwich panel" to rectify the deficiencies of Tetsuo and Hirota '965 that are acknowledged in the Office Action. However, for at least the following reasons, the disclosure of Ueda cures neither the deficiencies of Tetsuo and Hirota '965 that are acknowledged in the Office Action, nor any of the above-described other deficiencies of Tetsuo and Hirota '965.

Applicants respectfully submit that the disclosure of Ueda is not pertinent because Ueda actually teaches away from the features of Applicants' claimed invention. Ueda discloses honeycomb sandwich panels as an interior material for artificial satellites or space stations. In order to be suitable for the environment of space, the panels must be resistant to vacuum. Therefore, Ueda's structures are subjected to a vacuum resistance

test. Test pieces are put into a vacuum chamber and a vacuum pump of a helium leak detector is repeatedly operated to depressurize and pressurize the chamber. The test panels are then checked and compared with panels which have not been tested (see Ueda paragraphs [0029]-[0047]). Ueda's method, therefore, is unrelated to Applicants' claimed leakage test.

Even more importantly, according to Ueda an air permeability test is performed, since honeycomb sandwich panels used for artificial satellites *require the pressures to be equal inside and outside the cells*. Therefore, conventionally, air vents are formed on side walls of the cells. Ueda alternatively provides for honeycomb sandwich panels having at least one of the front and rear surface layers made of phenolic resin in order to make the honeycomb sandwich panel breathable, that is, permeable for air (see Ueda paragraphs [0005], [0011], and [0012]).

The examiner asserts that "Ueda discloses honeycomb sandwich panels containing cells that are hermetically sealed (see [0005])" (Office Action page 3, paragraph 3). However, the passage cited by the examiner merely contains the notion that prior art panels are in general sealed (see Ueda paragraph [0004]).

Further, it is important to note that for the panels described by Ueda, *air leakage from the interior must be ensured, since the pressure must always be equal inside and outside the enclosed cells*.

Applicants' invention, however, is directed to a *leak detection method* which serves to identify defects through which air can escape from the interior of the investigated composite materials. Applying Applicants' claimed method to Ueda's honeycomb sandwich panel simply would not make sense, because, as Ueda teaches, air leakage is absolutely *necessary* for the panels. See, e.g., Ueda's teaching at paragraph [0012] that

the front or rear surface layer or both are *porous and breathable*. Therefore, when the panel is used in a vacuum, the air in the cells goes out through the front and rear surface layers. Thus, since no difference in pressure is made between the inside and the outside of the sandwich panel, the front and rear surface layers are prevented from being damaged or removed from the honeycomb core. (Emphasis added)

Therefore, Ueda's teaching of "porous and breathable" layers makes Ueda irrelevant to Applicants' claimed method for *leak-testing* a component.

Furthermore, there is simply no teaching in any of Tetsuo, Hirota '965, and Ueda that would have led one to select the references and combine them, let alone in a way that would produce the invention defined by Applicants' claim 1.

Accordingly, the combined disclosures of Tetsuo, Hirota '965, and Ueda would not have rendered obvious the invention defined by claim 1. Claims 2-4 and 6-10 are allowable because they depend, either directly or indirectly, from claim 1, and for the subject matter recited therein.

35 U.S.C. § 103(a)

Since the Tetsuo/Hirota '965/Ueda combination is applied in each of the other rejections under § 103(a) -- claims 5 and 14 as being unpatentable over Tetsuo in view of Hirota '965 and Ueda and further in view of U.S. Patent No. 4,553,435 to Goldfarb et al. ("Goldfarb"); claims 11-13 and 15 as being unpatentable over Tetsuo in view of Hirota '965 and Ueda and further in view of U.S. Patent No. 4,113,673 to Hirota et al. ("Hirota '673"); and claims 16 and 17 as being unpatentable over Tetsuo in view of Hirota '965, Ueda, and Goldfarb -- each of these rejections is also respectfully traversed. The combined disclosures of the cited references would not have rendered obvious Applicants' claimed invention because the disclosures of Goldfarb and Hirota '673 do not rectify any of the above-described deficiencies of Tetsuo, Hirota '965, and Ueda.

Furthermore, there is simply no teaching in any of the references that would have led one to select the references and combine them in a way that would produce the invention defined by any of Applicants' pending claims.

Therefore, the various combinations of references would not have rendered obvious the embodiments of the invention defined by Applicants' pending claims 5 and 11-17.

New claims 18-20 have been added to further define the scope of protection sought for Applicants' invention. New claims 18-20 are also allowable. The method defined by claim 18 includes the step of "completely wetting an area to be tested on at least



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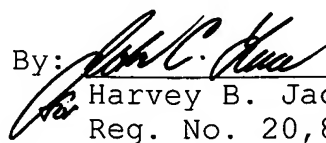
one side of the component with a film of a foam-forming testing liquid without immersing the component." See Applicants' disclosure at specification page 5 that "[s]ince the component to be tested *is not submersed in water*, also a more rapid, more reliable and more precise identification of the flaws and, consequently a simple marking of the same is possible" (emphasis added).

Since independent claim 18 includes at least the features discussed above with respect to claim 1, the references neither anticipate nor would have rendered obvious the method defined by claim 18. Claims 19 and 20 depend from claim 18, and are similarly allowable.

In view of the foregoing, this application is now in condition for allowance. If the examiner believes that an interview might expedite prosecution, the examiner is invited to contact the undersigned.

Respectfully submitted,

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